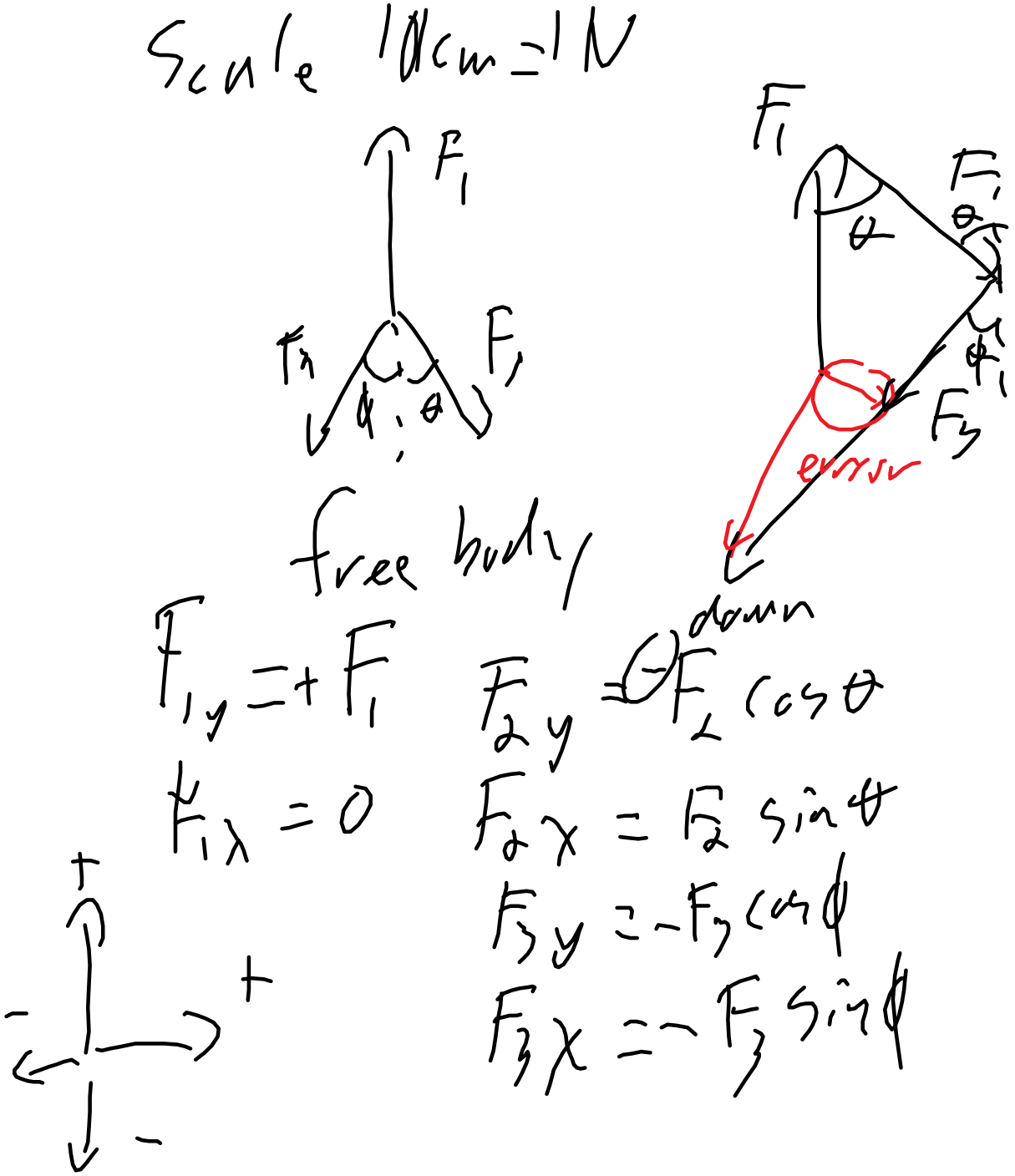
Lab calculations
Projectile theory



eg. A boat is moving at 5.0 m/s in a fast flowing river flowing at 3.0 m/s. What is the

resultant speed and time to cross the 50.0m wide river if

Velocity = speed + direction

a) the boat points directly across

$V_r = \sqrt{V_b^2 + V_s^2}$

$= \sqrt{3^2 + 5^2} = 5.83\ m/s$

Ignore stream speed

$\frac{50m}{5\ m/s} = \boxed{10\ s}$

perpendicular vectors are generally analyzed independently
(some exceptions, Relativity - Vx influences the time of Vy, or fluid dynamics, Vx infuences the Vy lift)

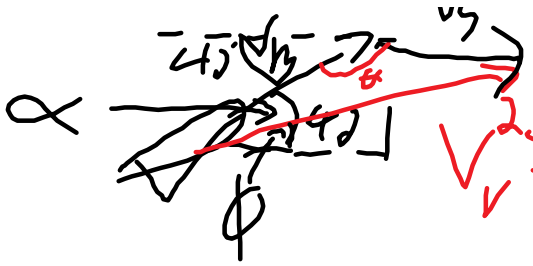
a) the boat points upstream so the resultant velocity is directly across

$V_r = \sqrt{V_b^2 - V_s^2} = \sqrt{5^2 - 3^2}$

$= \boxed{4.0\ m/s}$

$t = \frac{d}{v} = \frac{50}{4} = \boxed{12.5\ s}$

a) the boat points 42.1° off the shore pointing downstream.



$V_r^2 = V_B^2 + V_S^2 - 2 V_B V_S \cos\theta$ ∴

$V_r^2 = 5^2 + 3^2 - 2(5)(3)\cos(180-42)$

$V_r = 7.5 \text{ m/s}$

$\frac{\sin\alpha}{V_S} = \frac{\sin\theta}{V_r}$

$\phi = ? \quad 42.1 - \alpha$

$\alpha = \sin^{-1}\frac{V_S \sin\theta}{V_r}$

$\alpha = \sin^{-1}\left(\frac{3\sin(180-42.1)}{7.5}\right.$

$\alpha =$

Asin(3xSin(180-42.1)/7.5)=
15.55543867811472

42.1-15.555=26.545

so the boat moves at 7.5 m/s 26.5º to the shore going downstream.

Work on your lab

next class bring usb or computer with capstone and Quicktime custom installed with java enabled

https://www.youtube.com/watch?v=abUBrQmI33Q

https://www.youtube.com/watch?v=cxvsHNRXLjw